UNIVERSITY OF MYSORE

Ph.D. Entrance Examination, November - 2020

SUBJECT CODE : **2** **3**

Entrance Reg. No.

QUESTION BOOKLET
(Read carefully the instructions given in the Question Booklet)

SUBJECT : **ELECTRONICS**

MAXIMUM MARKS : 100 **MAXIMUM TIME : THREE HOURS**

(Including initial 10 minutes for filling O.M.R. Answer sheet)

INSTRUCTIONS TO THE CANDIDATES

1. The sealed questions booklet containing 50 questions enclosed with O.M.R. Answer Sheet is given to you.
2. Verify whether the given question booklet is of the same subject which you have opted for examination.
3. Open the question paper seal carefully and take out the enclosed O.M.R. Answer Sheet outside the question booklet and fill up the general information in the O.M.R. Answer sheet. If you fail to fill up the details in the form of alphabet and signs as instructed, you will be personally responsible for consequences arising during scoring of your Answer Sheet.
4. During the examination:
   a) Read each question carefully.
   b) Determine the Most appropriate/correct answer from the four available choices given under each question.
   c) Completely darken the relevant circle against the Question in the O.M.R. Answer Sheet. For example, in the question paper if "C" is correct answer for Question No.8, then darken against Sl. No.8 of O.M.R. Answer Sheet using Blue/Black Ball Point Pen as follows:

   Question No. 8. Ⓐ Ⓑ ● Ⓓ (Only example) (Use Ball Pen only)

5. Rough work should be done only on the blank space provided in the Question Booklet. <u>Rough work should not be done on the O.M.R. Answer Sheet.</u>
6. <u>If more than one circle is darkened for a given question, such answer is treated as wrong and no mark will be given. See the example in the O.M.R. Sheet.</u>
7. The candidate and the Room Supervisor should sign in the O.M.R. Sheet at the specified place.
8. Candidate should return the original O.M.R. Answer Sheet and the university copy to the Room Supervisor after the examination.
9. Candidate can carry the question booklet and the candidate copy of the O.M.R. Sheet.
10. The calculator, pager and mobile phone are not allowed inside the examination hall.
11. **If a candidate is found committing malpractice, such a candidate shall not be considered for admission to the course and action against such candidate will be taken as per rules.**

INSTRUCTIONS TO FILL UP THE O.M.R. SHEET

1. There is only one most appropriate/correct answer for each question.
2. For each question, only one circle must be darkened with BLUE or BLACK ball point pen only. Do not try to alter it.
3. Circle should be darkened completely so that the alphabet inside it is not visible.
4. Do not make any stray marks on O.M.R. Sheet.

ಗಮನಿಸಿ : ಸೂಚನೆಗಳ ಕನ್ನಡ ಆವೃತ್ತಿಯು ಈ ಪುಸ್ತಕದ ಹಿಂಭಾಗದಲ್ಲಿ ಮುದ್ರಿಸಲ್ಪಟ್ಟಿದೆ.

M-5250

PART - A

This part shall contains 50 multiple choice/objective type questions, each question carrying one mark. [50×1=50]

1) A P-N junction mimics a closed switch when it
   (A) Cannot overcome its barrier voltage
   (B) Has a low junction resistance
   (C) Is reverse biased
   (D) Has a wide depletion region

2) Often a common-collector will be the last stage before the load; the main function(s) of this stage is to:
   (A) Provide voltage gain
   (B) Provide phase inversion
   (C) Provide a high-frequency path to improve the frequency response
   (D) Buffer the voltage amplifiers from the low-resistance load and provide impedance matching for maximum power transfer

3) The JFET is also known as square law device because its
   (A) Drain current varies as square of the gate source voltage
   (B) Transconductance curve is parabolic
   (C) Reverse gate leakage current varies as square of reverse gate voltage
   (D) Drain current varies as square of its drain voltage for a fixed Vgs

4) Which of the following diode exhibits negative resistance region
   (A) PN-junction diode   (B) Zener diode
   (C) Schottky diode   (D) Tunnel diode

5) An amplifier has a voltage gain of 100 V/V and a current gain of 1000A/A. The value of the power gain decibel is
   (A) 30db   (B) 40db
   (C) 50db   (D) 100db

6) Which logic is the fastest of all the logic families?
   (A) TTL   (B) ECL
   (C) HTL   (D) DTL

7) A ring counter consisting of 4 flip-flops will have

(A) 4 States   (B) 8 States

(C) 16 States   (D) Infinite states

8) Determine the output frequency for a frequency division circuit that contains 12 flip-flops with an input clock frequency of 20.48 MHz.

(A) 1.7067 MkHz   (B) 5 kHz

(C) 30.24 kHz   (D) 15 kHz

9) digital-to-analog converter is an application of the

(A) Voltage-to-current converter

(B) Scaling adder

(C) Noninverting amplifier

(D) Current-to-voltage converter

10) Sample-and-hold circuits in ADCs are designed to

(A) Sample and hold the output of the binary counter during the conversion process

(B) Stabilize the ADCs threshold voltage during the conversion process

(C) Stabilize the input analog signal during the conversion process

(D) Sample and hold the ADC staircase waveform during the conversion process

11) Mesh analysis is generally used to determine _____

(A) Voltage   (B) Current

(C) Resistance   (D) Power

12) The rms value of the voltage for a voltage function $v = 10 + 5\cos(628t + 300)v$ through a circuit is

(A) 5V

(B) 10V

(C) 10.6V

(D) 15V

13) The correct relation between energy and charge is

(A) Energy = voltage / charge

(B) Charge = Energy × voltage

(C) Energy = voltage × (charge) × 0.5

(D) Energy = voltage × charge

14) Consider the equation $s^3 + 3s^2 + 5s + 2 = 0$. How many roots are located in left half of s-plane?

(A) Zero

(B) Two

(C) Three

(D) Four

15) Which one of the following is not the property of root loci?

(A) The root locus is symmetrical about imaginary axis

(B) They start from the open loop poles and terminate at the open loop zeroes

(C) The breakaway points are determined from $dK/ds = 0$

(D) Segments of the real axis are the part of the root locus if and only is the total number of real poles and zeroes to their right is odd.

16) The number of software interrupts in 8085 is ____

(A) 5

(B) 8

(C) 9

(D) 10

17) Arrange the following instructions of 8085 in descending order w.r.t number of machine cycle

i)   LHLD

ii) ADD M

iii) JNC

iv) STA

(A) i, iv, iii, ii   (B) iv, i, ii, iii

(C) i, iv, ii, iii   (D) ii, iii,iv,i

18) The register which holds the information about the nature of results of arithmetic and logic operations is called as

(A) Accumulator

(B) Condition code register

(C) Flag register

(D) Process status register

19) For DIV BX instruction of 8086 the dividend must be in

(A) AX   (B) BX

(C) DXAX   (D) BXAX

20) Which of the following register can be addressed as byte?

(A) P1   (B) SCON

(C) TMOD   (D) TCON

21) A 400W carrier is amplitude modulated with $m = 0.75$. The total power in AM is

(A) 400W   (B) 512W

(C) 588W   (D) 650W

22) In the absence of noise, if C is channel capacity in bits/s, δf is channel bandwidth in Hz and N is number of coding levels. Then

(A) $C = \log_2 N$

(B) $C = (\delta f)\log_2 N$

(C) $C = 2(\delta f)\log_2 N$

(D) $C = 0.5(\delta f)\log_2 N$

23) Signal to quantization noise ratio in PCM system depends on _____

(A) Sampling rate

(B) Signal bandwidth

(C) Number of quantization levels

(D) Nature of carrier wave

24) If the baud rate is 400 for a QPSK, the bit rate is _____ bps.

(A) 400

(B) 800

(C) 1200

(D) 1600

25) The band gap energy of germanium at 300k is

(A) 0.785 ev

(B) 1.121 ev

(C) 1.212 ev

(D) 0.718 ev

26) If the current of an SCR increases, the forward breakdown voltage will

(A) Decreases

(B) Not be effected

(C) Increases

(D) Becomes zero

27) The maximum delay angle that can be achieved with an R-trigger circuit is

(A) 45°

(B) 90°

(C) 180°

(D) 120°

28) The function of a snubber circuit connected across an SCR is to

    (A) Suppress dv/dt

    (B) Increase dv/dt

    (C) Decrease dv/dt

    (D) Keep transient voltage at a constant value

29) The commutation circuit used in the controlled rectifiers is to

    (A) Turn-on the thyristors

    (B) Turn-off the thyristors

    (C) To increase the frequency of operation of the controlled rectifiers

    (D) To convert ac signal into dc signal

30) The main reason for the connecting of a pulse transformer at the output stage of the thyristor triggering circuit is to

    (A) Amplify the power of the triggering pulse.

    (B) Provide electrical isolation.

    (C) Reduce the turn on time of thyristor.

    (D) Avoid spurious triggering of the thyristor due to noise.

31) Do-While loop is example for

    (A) Exit checking loop   (B) Entry checking loop

    (C) No checking loop   (D) Middle checking loop

32) For initialization a = 5, c = 6 the value of a and c after this code will be c = (c) ? a = 0 : 2;

    (A) a = 0, c = 0;   (B) a = 0, c = 6;

    (C) a = 5, c = 6;   (D) a = 0, c = 2;

33) Maximum value of an unsigned integer is

    (A) 65535   (B) 32767

    (C) 255   (D) 127

34) What will happen if the following C code is executed
main()
{
int x[5];
x[5]=10;
}
(A) It will not be allowed, but no error message will be generated
(B) Compiler will generate an error message
(C) Fifth element of an array x will be assigned with value 10
(D) Some other data may be overwritten

35) What is size of generic pointer in c?
(A) 0bytes   (B) 1bytes
(C) 2bytes   (D) 3bytes

36) Discrete-time sinusoids whose frequencies are separated by an integer multiples of _____ are identical.

(A) $\dfrac{\pi}{2}$ (B) π

(C) $\dfrac{3\pi}{2}$ (D) 2π

37) The output of a causal system depends on
(A) Present and future inputs   (B) Present and past inputs
(C) Present input and present output (D) Past inputs and present output

38) In $x(n)$ is the input to the system having the impulse response $h(n)$, then the expression for the convolution sum $y(n)$ is

(A) $y(n) = \sum_{k=-\infty}^{\infty} x(k)h(n-k)$

(B) $y(n) = \sum_{k=-\infty}^{\infty} x(n)h(n-k)$

(C) $y(n) = \sum_{k=0}^{N-1} x(k)h(n-k)$

(D) $y(n) = \sum_{k=0}^{N-1} x(n)h(n-k)$

39) In MOSFET devices, the N-Channel type is better than the P-Channel type in the following respect.

(A) It has better noise immunity   (B) It is faster

(C) It is TTL compatible   (D) It has better drive capability

40) The real-valued continuous-time periodic signal has _____

(A) Line spectrum and its magnitude spectrum is even function

(B) Line spectrum and its phase spectrum is even function

(C) Continuous spectrum and its magnitude spectrum is even function

(D) Continuous spectrum and its phase spectrum is even

41) The function of SiO_2 layer in IC fabrication is

(A) Oxide masking   (B) Oxide passivation

(C) Oxide purification   (D) Both (A) & (B)

42) Epitaxial growth is best suited for

(A) Growing polycrystalline pure silicon

(B) Growing crystal of several inch thickness

(C) Very thick single crystal on a substrate

(D) Very thin single crystal on a substrate

43) Why MOSFET is preferred over BJT in IC components?

(A) MOSFET has low packing density

(B) MOSFET has medium packing density

(C) MOSFET has high packing density

(D) MOSFET has no packing density

44) Large scale integration chips have between

(A) Less than 10 components   (B) 100 and 1000 components

(C) 10 and 100 components   (D) More than 1000 components

45) Which is the final step in IC processing sequence

(A) Photolithography

(B) Chemical Vapour

(C) Metallization

(D) Oxidation

46) In an optical fiber, the concept of Numerical aperture is applicable in describing the ability of _____

(A) Light Collection

(B) Light Scattering

(C) Light Dispersion

(D) Light Polarization

47) In spontaneous emission, the light source in an excited state undergoes the transition to a state with _____

(A) Higher energy

(B) Moderate energy

(C) Lower energy

(D) Zero Energy

48) Multimode step index fiber has

(A) Large core diameter & large numerical aperture

(B) Large core diameter and small numerical aperture

(C) Small core diameter and large numerical aperture

(D) Small core diameter & small numerical aperture

49) Which among the following characteristics of Laser light specifies the precise movement of all individual light waves together through time and space?

(A) Monochromatic

(B) Directional

(C) Coherent

(D) Brightness

50) Which among the following is provided by an optical receiver for the regeneration of data signal with minimum error?

(A) Photo diode

(B) Infrared diode

(C) LASER

(D) Thermistor

PART - B

This part shall contains five questions, each question carrying ten marks.
$$[5 \times 10 = 50]$$

1. Design full subtractor and show the implementation of full subtractor using basic gates and only NAND gates.

2. With neat block diagram briefly explain internal architecture of 8086 microprocessor.

3. Explain **if-else** and **switch** statements with suitable example program.

4. Write a note on ASK, FSK, PSK, DPSK and QPSK

5. Explain various types of signals.

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ಅಭ್ಯರ್ಥಿಗಳಿಗೆ ಸೂಚನೆಗಳು

1. ಓ.ಎಂ.ಆರ್. ಉತ್ತರ ಹಾಳೆಯ ಜೊತೆಗೆ 50 ಪ್ರಶ್ನೆಗಳನ್ನು ಹೊಂದಿರುವ ಮೊಹರು ಮಾಡಿದ ಪ್ರಶ್ನೆ ಪುಸ್ತಕವನ್ನು ನಿಮಗೆ ನೀಡಲಾಗಿದೆ.

2. ಕೊಟ್ಟಿರುವ ಪ್ರಶ್ನೆ ಪುಸ್ತಕವು, ನೀವು ಪರೀಕ್ಷೆಗೆ ಆಯ್ಕೆ ಮಾಡಿಕೊಂಡಿರುವ ವಿಷಯಕ್ಕೆ ಸಂಬಂಧಿಸಿದ್ದೇ ಎಂಬುದನ್ನು ಪರಿಶೀಲಿಸಿರಿ.

3. ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆಯ ಮೊಹರನ್ನು ಜಾಗ್ರತೆಯಿಂದ ತೆರೆಯಿರಿ ಮತ್ತು ಪ್ರಶ್ನೆಪತ್ರಿಕೆಯಿಂದ ಓ.ಎಂ.ಆರ್. ಉತ್ತರ ಹಾಳೆಯನ್ನು ಹೊರಗೆ ತೆಗೆದು, ಓ.ಎಂ.ಆರ್. ಉತ್ತರ ಹಾಳೆಯಲ್ಲಿ ಸಾಮಾನ್ಯ ಮಾಹಿತಿಯನ್ನು ತುಂಬಿರಿ. ಕೊಟ್ಟಿರುವ ಸೂಚನೆಯಂತೆ ನೀವು ನಮೂನೆಯಲ್ಲಿನ ವಿವರಗಳನ್ನು ತುಂಬಲು ವಿಫಲರಾದರೆ, ನಿಮ್ಮ ಉತ್ತರ ಹಾಳೆಯ ಮೌಲ್ಯಮಾಪನ ಸಮಯದಲ್ಲಿ ಉಂಟಾಗುವ ಪರಿಣಾಮಗಳಿಗೆ ವೈಯಕ್ತಿಕವಾಗಿ ನೀವೇ ಜವಾಬ್ದಾರರಾಗಿರುತ್ತೀರಿ.

4. ಪರೀಕ್ಷೆಯ ಸಮಯದಲ್ಲಿ:

   a) ಪ್ರತಿಯೊಂದು ಪ್ರಶ್ನೆಯನ್ನು ಜಾಗ್ರತೆಯಿಂದ ಓದಿರಿ.

   b) ಪ್ರತಿ ಪ್ರಶ್ನೆಯ ಕೆಳಗೆ ನೀಡಿರುವ ನಾಲ್ಕು ಲಭ್ಯ ಆಯ್ಕೆಗಳಲ್ಲಿ ಅತ್ಯಂತ ಸರಿಯಾದ/ ಸೂಕ್ತವಾದ ಉತ್ತರವನ್ನು ನಿರ್ಧರಿಸಿ.

   c) ಓ.ಎಂ.ಆರ್. ಹಾಳೆಯಲ್ಲಿನ ಸಂಬಂಧಿಸಿದ ಪ್ರಶ್ನೆಯ ವೃತ್ತಾಕಾರವನ್ನು ಸಂಪೂರ್ಣವಾಗಿ ತುಂಬಿರಿ. ಉದಾಹರಣೆಗೆ, ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆಯಲ್ಲಿ ಪ್ರಶ್ನೆ ಸಂಖ್ಯೆ 8ಕ್ಕೆ "C" ಸರಿಯಾದ ಉತ್ತರವಾಗಿದ್ದರೆ, ನೀಲಿ/ಕಪ್ಪು ಬಾಲ್ ಪಾಯಿಂಟ್ ಪೆನ್ ಬಳಸಿ ಓ.ಎಂ.ಆರ್. ಉತ್ತರ ಹಾಳೆಯ ಕ್ರಮ ಸಂಖ್ಯೆ 8ರ ಮುಂದೆ ಈ ಕೆಳಗಿನಂತೆ ತುಂಬಿರಿ:

   ಪ್ರಶ್ನೆ ಸಂಖ್ಯೆ 8.Ⓐ Ⓑ ⬤ Ⓓ (ಉದಾಹರಣೆ ಮಾತ್ರ) (ಬಾಲ್ ಪಾಯಿಂಟ್ ಪೆನ್ ಮಾತ್ರ ಉಪಯೋಗಿಸಿ)

5. ಉತ್ತರದ ಪೂರ್ವಸಿದ್ಧತೆಯ ಬರವಣಿಗೆಯನ್ನು (ಚಿತ್ತು ಕೆಲಸ) ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆಯಲ್ಲಿ ಒದಗಿಸಿದ ಖಾಲಿ ಜಾಗದಲ್ಲಿ ಮಾತ್ರವೇ ಮಾಡಬೇಕು (ಓ.ಎಂ.ಆರ್. ಉತ್ತರ ಹಾಳೆಯಲ್ಲಿ ಮಾಡಬಾರದು).

6. <u>ಒಂದು ನಿರ್ದಿಷ್ಟ ಪ್ರಶ್ನೆಗೆ ಒಂದಕ್ಕಿಂತ ಹೆಚ್ಚು ವೃತ್ತಾಕಾರವನ್ನು ಗುರುತಿಸಲಾಗಿದ್ದರೆ, ಅಂತಹ ಉತ್ತರವನ್ನು ತಪ್ಪು ಎಂದು ಪರಿಗಣಿಸಲಾಗುತ್ತದೆ ಮತ್ತು ಯಾವುದೇ ಅಂಕವನ್ನು ನೀಡಲಾಗುವುದಿಲ್ಲ. ಓ.ಎಂ.ಆರ್. ಹಾಳೆಯಲ್ಲಿನ ಉದಾಹರಣೆ ನೋಡಿ.</u>

7. ಅಭ್ಯರ್ಥಿ ಮತ್ತು ಕೊಠಡಿ ಮೇಲ್ವಿಚಾರಕರು ನಿರ್ದಿಷ್ಟಪಡಿಸಿದ ಸ್ಥಳದಲ್ಲಿ ಓ.ಎಂ.ಆರ್. ಹಾಳೆಯ ಮೇಲೆ ಸಹಿ ಮಾಡಬೇಕು.

8. ಅಭ್ಯರ್ಥಿಯು ಪರೀಕ್ಷೆಯ ನಂತರ ಕೊಠಡಿ ಮೇಲ್ವಿಚಾರಕರಿಗೆ ಮೂಲ ಓ.ಎಂ.ಆರ್. ಉತ್ತರ ಹಾಳೆ ಮತ್ತು ವಿಶ್ವವಿದ್ಯಾನಿಲಯದ ಪ್ರತಿಯನ್ನು ಹಿಂದಿರುಗಿಸಬೇಕು.

9. ಅಭ್ಯರ್ಥಿಯು ಪ್ರಶ್ನೆ ಪುಸ್ತಕವನ್ನು ಮತ್ತು ಓ.ಎಂ.ಆರ್. ಅಭ್ಯರ್ಥಿಯ ಪ್ರತಿಯನ್ನು ತಮ್ಮ ಜೊತೆ ತೆಗೆದುಕೊಂಡು ಹೋಗಬಹುದು.

10. ಕ್ಯಾಲ್ಕುಲೇಟರ್, ಪೇಜರ್ ಮತ್ತು ಮೊಬೈಲ್ ಫೋನ್‌ಗಳನ್ನು ಪರೀಕ್ಷಾ ಕೊಠಡಿಯ ಒಳಗೆ ಅನುಮತಿಸಲಾಗುವುದಿಲ್ಲ.

11. **ಅಭ್ಯರ್ಥಿಯು ದುಷ್ಕೃತ್ಯದಲ್ಲಿ ತೊಡಗಿರುವುದು ಕಂಡುಬಂದರೆ, ಅಂತಹ ಅಭ್ಯರ್ಥಿಯನ್ನು ಕೋರ್ಸ್‌ಗೆ ಪರಿಗಣಿಸಲಾಗುವುದಿಲ್ಲ ಮತ್ತು ನಿಯಮಗಳ ಪ್ರಕಾರ ಇಂತಹ ಅಭ್ಯರ್ಥಿಯ ವಿರುದ್ಧ ಕ್ರಮ ಕೈಗೊಳ್ಳಲಾಗುವುದು.**

ಓ.ಎಂ.ಆರ್. ಹಾಳೆಯನ್ನು ತುಂಬಲು ಸೂಚನೆಗಳು

1. ಪ್ರತಿಯೊಂದು ಪ್ರಶ್ನೆಗೆ ಒಂದೇ ಒಂದು ಅತ್ಯಂತ ಸೂಕ್ತವಾದ/ಸರಿಯಾದ ಉತ್ತರವಿರುತ್ತದೆ.

2. ಪ್ರತಿ ಪ್ರಶ್ನೆಗೆ ಒಂದು ವೃತ್ತವನ್ನು ಮಾತ್ರ ನೀಲಿ ಅಥವಾ ಕಪ್ಪು ಬಾಲ್ ಪಾಯಿಂಟ್ ಪೆನ್ನಿಂದ ಮಾತ್ರ ತುಂಬತಕ್ಕದ್ದು. ಉತ್ತರವನ್ನು ಮಾರ್ಪಡಿಸಲು ಪ್ರಯತ್ನಿಸಬೇಡಿ.

3. ವೃತ್ತದೊಳಗಿರುವ ಅಕ್ಷರವು ಕಾಣದಿರುವಂತೆ ವೃತ್ತವನ್ನು ಸಂಪೂರ್ಣವಾಗಿ ತುಂಬುವುದು.

4. ಓ.ಎಂ.ಆರ್. ಹಾಳೆಯಲ್ಲಿ ಯಾವುದೇ ಅನಾವಶ್ಯಕ ಗುರುತುಗಳನ್ನು ಮಾಡಬೇಡಿ.

Note : English version of the instructions is printed on the front cover of this booklet.